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USDA Forest Service
Research Paper INT-70
1969

ESTIMATION OF VISITOR USE FROM SELF-REGISTRATION AT DEVELOPED RECREATION SITES

MAY 14 1970
CURRENT SERIAL RECORDS

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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
Ogden, Utah

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ESTIMATION OF VISITOR USE FROM SELF-REGISTRATION AT DEVELOPED RECREATION SITES

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INTRODUCTION

Double-sampling methods have provided a good start in estimating visitor use of developed recreation sites, and the traffic counter version of double sampling is widely used now by the Forest Service.[1] The basic idea in double sampling is simple. The relationship between visitor use and traffic counts (or some other predictor variable) is established from sample counts made at the same time for both use and traffic. This relationship is then applied to the season-long traffic count record to estimate season-long use.

In double-sampling estimates based on traffic counts, errors seem to come mainly from the fairly loose relationship of traffic counts to recreational use, rather than from inaccuracies in sample counts. Both water consumption and "net counts" of axles from printing traffic counters have been tested and have advantages over conventional traffic counters as predictor variables.[2] [3] However, even better predictor variables would be desirable and may be available.

What we need is a predictor variable that is closely related to visitor use, inexpensively measured, and not affected by mechanical breakdowns of equipment. In addition, if the relationship between the predictor variable and visitor use was fairly consistent from site to site, then approximate but still useful estimates of use could be made on sites for which sample counts of visitors were not available.

Because self-registration cards seemed to provide a predictor variable with these desirable characteristics, a method using such cards was developed and tested. The campgrounds studied had self-registration systems, traffic count data, and sample counts of visitors. Therefore, the new sampling method could be compared to the existing traffic counter method. This paper reports on the test of this method. It also provides procedures for applying the method.

Procedures were designed to estimate visitor use from self-registrations for three different situations:

Situation 1. Estimates for a recreation site during a year when sample counts are made.

Situation 2. Estimates for the same site for several additional years when no sample counts are made.

Situation 3. Estimates for other sites where no sample counts are made at all.

In all three situations, visitor self-registration data are collected. Sample visitor counts are taken only in situation 1. The relationships computed in situation 1 are used to estimate use in both situations 1 and 2. For situation 3, area-wide relationships are computed from sites that were sampled, and these are used to estimate use at similar but unsampled sites.

---

[1] For example, see James, George A. Instructions for using traffic counters to estimate recreation use on developed sites. U.S. Forest Serv., Southeastern Forest Exp. Sta. 12 pp. 1966.

[2] James, George A., and Gary L. Tyre. Use of watermeter records to estimate recreation visits and use on developed sites. U.S. Forest Serv. Res. Note SE-73, 3 pp. 1967.

[3] Wagar, J. Alan, and Joel F. Thalheimer. Trial results of net-count procedures for estimating visitor use at developed recreation sites. USDA Forest Serv. Res. Note INT-105. 1969.

The following printout is provided for situations 1 and 2 by the computer using the program that has been designed for the self-registration method:

```
REGION   4, FOREST 10, DISTRICT   7,  PRINCIPAL SITE    18.0, KIND  41.1

DEVILS CANYON              , SEASON FROM  6-17 TO  9- 9 1967, SERIAL NO. R4-12

     YEARS SINCE VISITOR COUNTS MADE,   34 FACILITY GROUPINGS

     ACTIVITY AND NUMBER                           VISITOR DAYS     PERCENT ERROR  (.90 CONF)

DAYTIME USE

     PICNICKING(43.1)                                       51.                  148.88

     CAMPING(41.1)                                         521.                   29.07

     TEAM SPORTS(21.0)                                      51.                  148.88

     VIEW SCENERY(1.1)                                     156.                   48.59


     TOTAL  (DAY)                                          779.                   34.22

NIGHT TIME USE

     OVERNIGHT CAMPING                                    1809.                   16.02

TOTAL USE  (DAY AND NIGHT)                                2588.                   15.64

                                                AVE. OCCUPANCY        PERCENT ERROR  (.90 CONF)


FACILITY GROUPINGS OCCUPIED  (DAY)                          3.                    20.48
                                                 (  8.56 PERCENT OCCUPIED)

FACILITY GROUPINGS OCCUPIED  (NIGHT)                        5.                     9.82
                                                 ( 15.73 PERCENT OCCUPIED)


ROUGH ESTIMATE OF VISITORS =          1687.
```

The following printout is provided for situation 3:

```
REGION   6, FOREST 13, DISTRICT  2, PRINCIPAL SITE   146.0, KIND   41.1

HELLS CROSSING             , SEASON FROM  5-25  TO  9- 6 1968, SERIAL NO. 0014046

ESTIMATE BASED ON REGIONAL RELATIONSHIPS,     17 FACILITY GROUPINGS

REGISTERED VISITOR HOURS   (DAY) =   27039., DAYTIME HOURS IN SEASON=    1260.

REGISTERED VISITOR HOURS  (NIGHT) =    28992., NIGHT TIME HOURS IN SEASON=  1260.

                                                VISITOR DAYS  PERCENT ERROR (.90 CONF)

DAYTIME USE                                             2525.                74.38

NIGHT TIME USE                                          3799.                65.81

TOTAL USE                                               6324.                49.45

     ROUGH ESTIMATE OF VISITORS =         2323.
```

A TEST OF THE SELF-REGISTRATION METHOD

During the summer of 1967, self-registration records and visitor-use counts were taken for the 42-unit Panguitch Lake Campground on the Dixie National Forest in southern Utah, the 34-unit Devil's Canyon Campground on the Manti-LaSal National Forest in central Utah, and the 23-unit Green River Lakes Campground on the Bridger National Forest in western Wyoming. The Panguitch Lake and Green River Lakes Campgrounds are both destination sites. Many visitors used these for extended periods. By contrast, Devil's Canyon was used primarily as a transient, one-night-stop campground.

Data Collection and Processing Procedures

At the three recreation sites, the visitor registration record was obtained from self-registration cards, while the visitor-use counts were taken on a random schedule.

Self-registration cards

At the entrance to each recreation site studied, cards were provided in two boxes on a large sign. Instructions on the sign read as follows:

FOR HOLDERS OF $7.00 ENTRANCE PERMIT

1. Select a vacant camp unit.
2. Fill out one of the GOLD CARDS available from the dispenser and deposit it in the DISPLAY BOX at your camp unit.

FOR HOLDERS OF $1.00 DAILY PERMITS

1. Select a vacant camp unit.
2. Deposit your $1.00 DAILY PERMIT in the DISPLAY BOX at your camp unit.

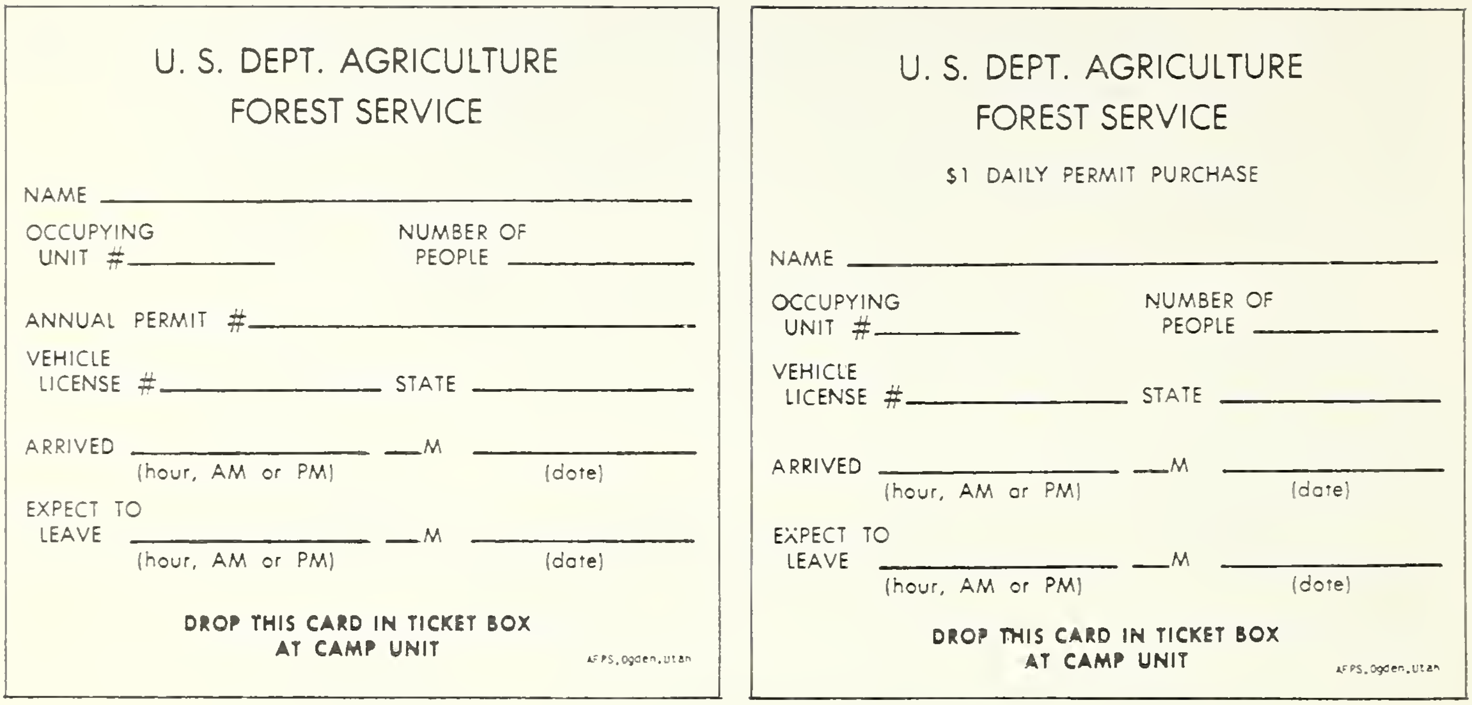
FOR ALL OTHERS

1. Select a vacant camp unit.
2. Obtain an envelope from the envelope dispenser. Fill in the information requested on the ENVELOPE and the enclosed PINK CARD.
3. Place $1.00 in the ENVELOPE, seal, and drop in the DEPOSIT BOX.
4. Place the PINK CARD in the DISPLAY BOX at your camp unit.

Unfortunately, the location of these signs was not the same at all three sites. At Green River Lakes, the sign was on the left-hand side of the road. At Panguitch Lake, it was on the right-hand side of the road. Only at Devil's Canyon, was it on an island in the center of the road so that drivers could take registration cards without leaving their vehicles.

The registration information requested on the cards (fig. 1) included name, unit occupied, number of people in group, annual permit number (gold cards only), vehicle license and state, time and date of arrival, and expected time and date of departure. Cards were collected weekly, were marked and bundled separately for each site, and were forwarded to the Regional Office for coding and keypunching.

Some editing of the cards was necessary before they were coded for keypunching. Each visitor group with a Federal Recreation Permit normally filled out only one gold registration card. Visitors without the permit sometimes filled out several pink cards--one for each day of their visit. Names and dates were compared on these cards and the data were combined on a single card. A few visitors had daily permits, obtained



U. S. DEPT. AGRICULTURE
FOREST SERVICE

NAME ____________________

OCCUPYING UNIT # ________ NUMBER OF PEOPLE ________

ANNUAL PERMIT # ____________________

VEHICLE LICENSE # ________ STATE ________

ARRIVED ________ (hour, AM or PM) __M ________ (date)

EXPECT TO LEAVE ________ (hour, AM or PM) __M ________ (date)

DROP THIS CARD IN TICKET BOX AT CAMP UNIT

AFPS, Ogden, Utah

U. S. DEPT. AGRICULTURE
FOREST SERVICE

$1 DAILY PERMIT PURCHASE

NAME ____________________

OCCUPYING UNIT # ________ NUMBER OF PEOPLE ________

VEHICLE LICENSE # ________ STATE ________

ARRIVED ________ (hour, AM or PM) __M ________ (date)

EXPECT TO LEAVE ________ (hour, AM or PM) __M ________ (date)

DROP THIS CARD IN TICKET BOX AT CAMP UNIT

AFPS, Ogden, Utah

Figure 1.--Self-registration cards used in 1967 for checking Federal Recreation Area Entrance Permits, Region 4, Forest Service. The card at left (gold) was for groups having the $7.00 permit. The card at right (pink) was for groups not having the annual permit.

directly from National Forest or District Ranger Offices. Registration was not required for holders of daily permits, but daily permits represented only a tiny fraction of total use and were not used as part of the self-registration record..

Of the cards collected on the three study sites, 81 percent were filled in completely enough to be usable. If arrival and departure information on the cards was incomplete, and if groups had stayed more than 2 days, some arrival and departure times were estimated and filled in. (It was assumed that salvaging cards for relatively long-term visitors would enhance the registration record more than it would detract from it by introducing inaccuracies. However, to simplify the instructions and reduce coding time, procedures described on pages 23-26 require use of completed cards only.)

Self-registration cards were coded for keypunching, using the procedures described on pages 23-26. Devil's Canyon Campground had the largest number of usable cards--319. Because data from three cards were punched on one computer card, 107 computer cards were needed. An additional 25 cards were punched to give visitor-count data, sampling times, and site identification. All data for Devil's Canyon Campground required approximately 3 hours of office preparation and 2 hours of keypunching and verifying.

Visitor-use counts

During the summer-use season, 12 day-long visitor-use counts were made for each of the three sites using the double-sampling procedures given in the Forest Service Recreation Information Management Handbook.[4] However, because an earlier study had shown that single on-the-hour counts are nearly as effective as day-long counts for estimating total visitor use, only some of the double-sampling data were needed. To provide on-the-hour counts, one of the eleven 45-minute counts made between 0915 (9:15 a.m.) and 2000 (8:00 p.m.) was selected at random from each completed sampling record form (fig. 2). To simplify recording and data processing, all times were recorded on a 24-hour basis.

---

[4] Forest Service Handbook 2309.11, Sec. 124.72, Forest Serv., U.S. Dep. Agr. September 1967.

The counts at 2015 for number of persons and for number of auto, tent, and trailer units were taken from the "overnight use" portion of each sampling record form as a basis for estimating nighttime use. It was assumed that most overnight visitors would be at their sites by 2015 and that the count would be representative of use for the night.

Because self-registration equipment was not installed until mid-June on one area and early July on the others, not all 12 sample dates at each site were usable in computations. Estimates for Green River Lakes Campground were based on eight sampling dates; for Panguitch Lake, 10 dates; and for Devil's Canyon, 11 dates.

The fact that each visitor count was taken between 15 and 60 minutes after the hour made coding of sample count times and arrival and departure times a bit awkward during the study. This awkwardness has been eliminated by modifying the sampling times in the instructions (see page 21).

Statistical Procedures

Situation 1, sampled site, season sampling takes place.--Relationships between visitor counts and self-registration data were established by regression analysis, and season-long estimates of visitor use were then made by applying these relationships to the season-long record of self-registration.

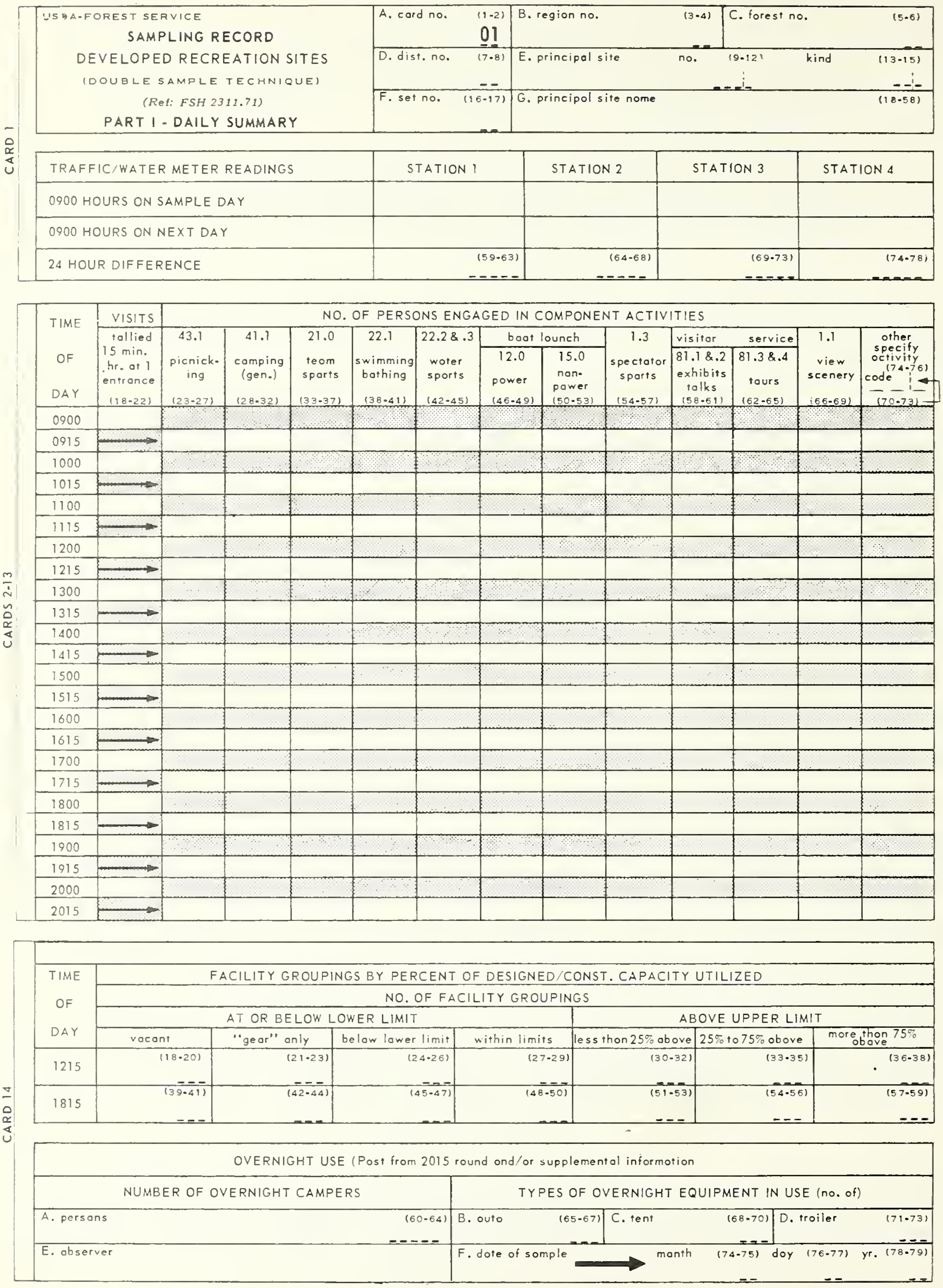
The on-the-hour daytime counts provided visitor values for up to 12 activities, giving up to 12 sets of Y's. These were designated Y_{1i}, Y_{2i}, Y_{3i}, . . . Y_{11i}, Y_{12i}. Totaling of visitor use for each count provided another set Y_{T_i}. The counts for nighttime use provided an additional set of values designated Y_k.

The number of people registered as present during each on-the-hour visitor count was determined by the computer from the self-registration cards, providing a set of sample daytime values, X_i, and a set of sample nighttime values, X_k. The season-long number of all registered visitor-hours was also summarized by computer, with the daytime sum designated $\sum_{i=1}^{N} X_i$ and the nighttime sum designated $\sum_{k=1}^{N} X_k$, where N indicates the number of daytime or nighttime hours in the season.

For individual recreation sites, the regression of each set of Y values on the appropriate X values gave equations of the form $Y = a + bX$ for each daytime activity, for total daytime use, and for nighttime use. These equations give estimates of use for one hour. To give season-long estimates, these equations were used in the form

$$\Sigma Y = N(a) + b(\Sigma X)$$

where N is the season-long number of hourly values going into the season-long sum of registered visitor hours (ΣX). For example, a 100-day season with daytime hours defined as the 12 on-the-hour times 0800 to 1900 would give a value of N=100 X 12=1200.



CARD 1

USDA-FOREST SERVICE
SAMPLING RECORD
DEVELOPED RECREATION SITES
(DOUBLE SAMPLE TECHNIQUE)
(Ref: FSH 2311.71)
PART I - DAILY SUMMARY

A. card no. (1-2) 01	B. region no. (3-4)	C. forest no. (5-6)
D. dist. no. (7-8)	E. principal site no. (9-12) kind (13-15)	
F. set no. (16-17)	G. principal site name (18-58)	

TRAFFIC/WATER METER READINGS	STATION 1	STATION 2	STATION 3	STATION 4
0900 HOURS ON SAMPLE DAY				
0900 HOURS ON NEXT DAY				
24 HOUR DIFFERENCE	(59-63)	(64-68)	(69-73)	(74-78)

CARDS 2-13

TIME OF DAY	VISITS	NO. OF PERSONS ENGAGED IN COMPONENT ACTIVITIES											
	tallied 15 min. hr. at 1 entrance	43.1	41.1	21.0	22.1	22.2 & .3	boat launch		1.3	visitor service		1.1	other specify activity
		picnicking	camping (gen.)	team sports	swimming bathing	water sports	12.0 power	15.0 non-power	spectator sports	81.1 &.2 exhibits talks	81.3 &.4 tours	view scenery	(74-76) code
	(18-22)	(23-27)	(28-32)	(33-37)	(38-41)	(42-45)	(46-49)	(50-53)	(54-57)	(58-61)	(62-65)	(66-69)	(70-73)
0900													
0915	→												
1000													
1015	→												
1100													
1115	→												
1200													
1215	→												
1300													
1315	→												
1400													
1415	→												
1500													
1515	→												
1600													
1615	→												
1700													
1715	→												
1800													
1815	→												
1900													
1915	→												
2000													
2015	→												

CARD 14

TIME OF DAY	FACILITY GROUPINGS BY PERCENT OF DESIGNED/CONST. CAPACITY UTILIZED						
	NO. OF FACILITY GROUPINGS						
	AT OR BELOW LOWER LIMIT				ABOVE UPPER LIMIT		
	vacant	"gear" only	below lower limit	within limits	less than 25% above	25% to 75% above	more than 75% above
1215	(18-20)	(21-23)	(24-26)	(27-29)	(30-32)	(33-35)	(36-38)
1815	(39-41)	(42-44)	(45-47)	(48-50)	(51-53)	(54-56)	(57-59)

OVERNIGHT USE (Post from 2015 round and/or supplemental information

NUMBER OF OVERNIGHT CAMPERS	TYPES OF OVERNIGHT EQUIPMENT IN USE (no. of)		
A. persons (60-64)	B. auto (65-67)	C. tent (68-70)	D. trailer (71-73)
E. observer	F. date of sample → month (74-75) day (76-77) yr. (78-79)		

2300-40 (4-67)

Figure 2.--Sampling record form.

Variance for each estimate was computed as

$$S^2_{\Sigma Y} = N(N-n)\ S^2_{y \cdot x} \left\{ \frac{1}{n} + \frac{(\overline{X}_N - \overline{X}_n)^2}{\Sigma x^2} \right\}$$

where

N is as previously defined

n is the number of paired X and Y values used for the regression

$S^2_{y \cdot x}$ is the mean squared deviation from regression

Σx^2 is the sum of squared deviations from the mean for the set of X values used for regression

N and n as subscripts denote whether a mean is based on N or n values.

The term $N(N-n)$ is equivalent to N^2 times the finite population correction $1 - (n/N)$. In this the value N^2 converts the variance for $\overline{Y}$ to the variance for ΣY, where the summation is for N sampling hours.

When the estimate for total daytime use was combined with the estimate for total overnight use, variance for the combined estimate was computed as

$$\mathrm{Var}_T = \mathrm{Var}_1 + \mathrm{Var}_2 + 2r\sqrt{\mathrm{Var}_1\ \mathrm{Var}_2}$$

where

Var_T is variance for the combined estimate

Var_1 is variance for the season-long estimate of daytime use

Var_2 is variance for the season-long estimate of nighttime use

r is the correlation coefficient between daytime and nighttime values of X for the sampling times. (In case of an unequal number of daytime and nighttime samples, n was defined as the lesser number and r was computed from n pairs of sample counts.)

The term $2r\sqrt{\mathrm{Var}_1\ \mathrm{Var}_2}$ was required for 1967 data because daytime and nighttime samples were taken on the same dates and were correlated. However, if daytime and nighttime samples are selected independently, as was done in 1968, this term is not needed. Variance for the combined estimate then becomes

$$\mathrm{Var}_T = \mathrm{Var}_1 + \mathrm{Var}_2$$

Confidence intervals for the combined estimate were computed as $\pm\ t\sqrt{\mathrm{Var}_T}$ at $n - 2$ degrees of freedom, where n is the number of daytime or nighttime sample counts, whichever is smaller. This gives confidence intervals slightly larger than would be computed if the most appropriate value were used for degrees of freedom. This value lies somewhere between the number for the smaller sample and the combined number of daytime and evening samples. However, procedures for determining the most appropriate value are more complex than would be justified here.[5]

Regression procedures were used also to estimate the average number of campground units occupied for daytime and for overnight periods and to estimate the season-long percentage of camping equipment units in the categories of AUTO, TENT, and TRAILER (see "Nighttime Counts" page 22). Confidence intervals were computed for occupancy of facility groupings but not for camping equipment types.

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[5] Cochran, William G. P. 73, in: Sampling techniques. New York: John Wiley and Sons, Inc. 1953.

Situation 2, sampled site, subsequent seasons.--The regression relationships, as established for a specific site during a season of sample visitor counts, permit estimation of use from the self-registration record alone during several subsequent seasons, provided there are no major changes in the site.

Situation 3, sites not sampled.--A set of area-wide regression relationships was developed from the combined data for the three sites.[6] For these regression relationships, counts of total visitors present for daytime (Y_{T_i}) and for nighttime (Y_k) were paired with the corresponding numbers of people registered $(X_{1_i}$ or $X_{1_k})$. The number of facility groupings (designated X_2) at a site was added as a third variable, and the data for the three sampled sites were pooled. One regression was then run for the daytime data $(Y_i$, X_{1_i}, and $X_2)$ and another for the nighttime data $(Y_k$, X_{1_k}, and $X_2)$.

The number of campground units (X_2) was included to adjust for the likelihood that people are more likely to register after the site begins to fill. Registration may then seem needed as a "claim stake" to guarantee possession. However, the number of people who must be present before the site will seem full will depend on the number of facilities at the site. As a result, the same number of completed registrations might indicate different numbers of people present on sites of different sizes.

The two regressions resulting from the pooled data are of the form

$$Y = a + b_1X_1 + b_2X_2.$$

For season-long estimates, these are used in the form

$$\Sigma Y = N(a + b_2X_2) + b_1 (\Sigma X_1)$$

where N is the season-long number of hourly values going into ΣX_1.

If based on a representative group of recreation sites, area-wide regression relationships developed in this manner can, with caution, be applied within the same general vicinity to similar sites that have self-registration but no visitor sampling. The 1968 data from three sampled sites were used to develop area-wide regression relationships that were then applied to a fourth site that had no visitor sampling.

It must be recognized, however, that the combined data from several sites represent cluster sampling rather than strictly random sampling. As a result, confidence intervals can be underestimated.

When use was estimated from area-wide regression relationships, variance for each estimate was computed as

$$S^2_{\Sigma Y} = N^2S^2_{y\cdot 12}\left\{\frac{1}{n} + C_{11}\,(\overline{X}_{1_N} - \overline{X}_{1_n})^2 + C_{22}\,(\overline{X}_{2_N} - \overline{X}_{2_n})^2 + C_{12}\,(\overline{X}_{1_N} - \overline{X}_{1_n})\,(\overline{X}_{2_N} - \overline{X}_{2_n})\right\}$$

where

N is as previously defined

---

[6] The procedures were refined and applied to additional sites in 1968 (see p. 12).

$S^2_{y.12}$ is the mean squared deviation from regression

n is the number of sample counts used for the regression

N and n as subscripts denote whether a mean is based on N or n values

C_{11}, C_{22}, and C_{12} are the "multipliers" as used by Snedecor.[7]

When the estimate for total daytime use was combined with the estimate for total overnight use, variance for the combined estimate (1968 data) was computed as

$$Var_T = Var_1 + Var_2$$

where the symbols are as previously defined.

Confidence intervals for the combined estimate were then computed as $\pm\, t\sqrt{Var_T}$ at n-3 degrees of freedom. In this case n is the total number of sample counts going into the regression for daytime or nighttime, whichever is smaller. Again, t is based on fewer than the appropriate degrees of freedom to avoid complex approximation procedures and to give confidence intervals slightly larger than could be obtained by refined procedures.

This conservative approach may partly offset possible underestimation of confidence intervals, which could result because regressions for the combined data are based on cluster samples rather than strictly random samples. Nevertheless, estimates based on these procedures must still be applied with caution and should be treated as approximations rather than precise estimates.

Estimation of visitors.--Because rough estimates of visitors are sometimes needed for such purposes as news releases, computations were also programed to adjust the number of registered visitors by a ratio that indicates what proportion of visitors actually register:

$$\text{Estimated visitors} = RV\left(\frac{SUMN}{RHN}\right)$$

where

a visitor is defined as one person's use of a recreation site for as long as he occupies it, either in person or with his belongings[8]

RV is the number of registered visitors as found by summing the people per vehicle for all registration cards collected during the season. Thus a card listing five people contributes five registered visitors to RV

SUMN is the season-long regression estimate for nighttime use expressed in visitor-hours

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[7] Snedecor, George W. P. 418, in: Statistical methods. 5th ed. Ames: Iowa State Univ. Press. 1956.

[8] As a unit of use, "visitor" is much different from the "visit" recorded in the traffic-counter method each time a person enters an area, whether he has already established occupancy there or not. As a result, many fewer visitors than visits are estimated.

RHN is the number of registered visitor hours included in nighttime periods during the visitor season. Thus, if the visitors who arrived in one vehicle registered three people as arriving at 1600 on one day and as leaving at 0900 the next, and if the nighttime period was defined as the 12 on-the-hour times 2000 to 0700, they would contribute 3 X 12 = 36 registered visitor hours to RHN.

The ratio for adjusting registered visitors is taken from nighttime data because results of the testing showed that many of the visitors who establish occupancy at a destination site are away from the site during the day. Therefore, they are missed during the daytime sample counts, and the ratio of registered visitors to actual visitors increases during daytime periods. For example, daytime registration at Green River Lakes actually exceeded the estimation of daytime use. Total visitors would obviously be grossly underestimated for some sites if registered visitors were adjusted by daytime data. However, most visitors have returned to the site by evening when sample counts for nighttime use are made. Thus nighttime sample counts provide a better indication of how many visitors actually are represented by each registered visitor.

Use of nighttime data for adjustment is based on the assumption that about the same percentage of visitors will register in daytime and nighttime. Actually, it is likely that daytime periods include more short-term visitors than do nighttime periods. Such visitors may stop only for water, to use the restrooms, or to take a quick look at the area, and may not bother to register; consequently, estimates of daytime visitors are likely to be low but will serve as a "floor," or minimum, that can be legitimately raised if it is known that many short-term visitors do not register.

Results and Discussion

Relationships for Individual Sites

Estimates of total visitor use from regression relationships based on self-registration data were as precise as estimates based on pneumatic traffic counter data (table 1).[9] However, the self-registration data were obtained with only one-sixth the man-hours of effort required for the traffic-counter method. Because of this greater efficiency, the self-registration method should permit cost reductions in obtaining estimates, increased precision of estimates, or some of both.

Two factors explain this increase in efficiency. First, a fairly constant proportion of visitors willingly registers at a given recreation site, yielding a consistent relationship of registrations to visitor use. By contrast, observations at recreation sites have demonstrated that axle counts from pneumatic counters vary widely between visitors. As a result, consistency between axle counts and visitors is too low for accurate prediction.

Second, a single, on-the-hour count per sample day is as closely related to self-registration records as is a day-long sequence of 12 hourly counts per sample day to traffic-counter records. Therefore, equally precise estimates of total use are obtained with the self-registration method with much less counting.

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[9] Estimates calculated by slightly modified procedures for the following three campgrounds sampled on the Snoqualmie National Forest in western Washington during 1968 had a 90% likelihood of including actual use within these confidence intervals: ±18.90% at Cottonwood; ±15.24% at Sawmill Flat; ±12.53% at Cedar Springs.

Table 1.--Comparison of self-registration and traffic-counter estimates of visitor use on three National Forest campgrounds

Activity	Self-registration estimate[1]		Traffic-counter estimate[2]	
	Visitors	Visitor days[3]	Visits	Visitor days[3]
		DEVIL'S CANYON		
Picnicking		51(83.6)		549(25.6)
Day camping		521(16.3)		596(16.4)
Night camping		1,809(9.0)		1,839(16.0)
Camping (all)		[4]2,330		2,435(15.9)
Team sports		51(83.6)		27(80.6)
View scenery		156(27.3)		186(18.4)
Total	[4]1,687	2,588(11.1)	3,640(17.5)	3,203(12.9)
		PANGUITCH LAKE		
Picnicking		(5)		128(65.9)
Day camping		3,720(12.8)		5,434(5.5)
Night camping		6,841(10.7)		7,947(6.6)
Camping (all)		[4]10,560		13,531(5.2)
View scenery		(5)		22(62.0)
Total	[4]1,647	10,560(11.2)	13,961(6.7)	13,531(5.2)
		GREEN RIVER LAKES		
Picnicking		(5)		50(61.1)
Day camping		919(30.4)		1,015(20.0)
Night camping		4,331(15.5)		3,419(18.1)
Camping (all)		[4]5,250		4,434(18.6)
Nonpower boat launch		(5)		1(72.7)
View scenery		410(42.0)		147(20.1)
Total	[4]1,164	5,660(17.7)	5,450(15.1)	4,632(18.2)

---

[1] Based on the following sampling done in 1967: 22 man-hours over an 85-day period (6/17-9/9) at Devil's Canyon; 20 man-hours over 74-day period (7/2-9/13) at Panguitch Lake; and 16 man-hours over 83-day period (7/4-9/24) at Green River Lakes.

[2] Based on the following sampling done in 1967: 144 man-hours over a 100-day period at Devil's Canyon; 144 man-hours over a 99-day period at Panguitch Lake; and 144 man-hours over a 75-day period at Green River Lakes.

[3] Figures in parentheses give approximate errors in percent expressed at the 0.67 level of confidence. These can be expressed at the 0.90 level of confidence if multiplied by 1.8. Although computations are in visitor hours, final results are converted to visitor days. One visitor day equals 12 visitor hours.

[4] Error not computed.

[5] Missed during sampling.

For estimating participation in specific activities, however, the single count per sample day is less precise than the day-long sequence of counts. For example, because few people picnic during the morning hours, approximately half of the on-the-hour counts will record little or no picnicking, even though visitors are present. Picnicking was completely missed at Panguitch Lake and Green River Lakes (table 1). Therefore, sampling error for estimates of individual activities may be relatively high.

This problem can be solved in either of two ways. Often administrators will be able to estimate what proportion of use is in each activity if they have dependable estimates of total use. Or, time of day and time of season could be recorded and used in the analysis as additional predictor variables. This would only slightly complicate the data collection task, and would probably provide increased accuracy from a given amount of data. However, it would make the computer handling of the data much more complex and would require more computation time. The programs developed during the study will not handle the extra predictor variables.

Area-Wide relationships

If area-wide relationships are to be computed from the sampled-site data and then used to estimate visitor use at unsampled sites in the same vicinity, both patterns of use and registration equipment must be uniform from site to site. Otherwise the area-wide relationships will include too much variability to give usable estimates.

The problems of variability are illustrated by the three sites sampled during 1967. Ratios between visitors registered and visitors present differed substantially between destination and transient sites, especially during daytime when many registered visitors were away from the destination sites.

Table 2 shows that the proportion of visitors who register depends on how easy registration is made for them. Note that at Devil's Canyon Campground, where the signboard in the center of the road was easily reached by a seated driver, 72 percent of the estimated nighttime use was accounted for by registration cards. At Panguitch Lake, where the signboard on the right-hand side of the road was fairly easily reached by the passenger in an entering car, the percentage was 66. At Green River Lakes, the signboard on the left-hand side of the road could be reached only if someone from an entering car got out and crossed the road. Many visitors apparently didn't bother: only 44 percent of the estimated nighttime use was accounted for by registration cards.

On the basis of experience in 1967, four destination sites were selected for testing of area-wide relationships in 1968. These are on the Naches Ranger District of the Snoqualmie National Forest in western Washington and are within a few miles of each other. Sample counts were taken on three of the sites--the 15-unit Cottonwood Campground, the 19-unit Sawmill Flat Campground, and the 18-unit Cedar Springs Campground. The area-wide relationships computed from these sites were then applied to the 17-unit Hells Crossing Campground, which had visitor registration but no sample counts.

The estimate of total visitor use at Hells Crossing had a 90-percent likelihood of including actual use within ±49 percent. This probably is about the precision that can be expected for unsampled sites that have use patterns and registration procedures very similar to those on a group of sampled sites in the same vicinity. Precision might increase somewhat for larger sites, and some gain might result if registration boards are in the center of the road, rather than on the right-hand side as they were on the four sites reported here. However, as mentioned earlier, errors for area-wide estimates may be underestimated, and such estimates should be applied with caution.

Table 2.--Comparison between season-long regression estimates of visitor use and visitor use as shown on registration cards, according to type of site and placement of signboard bearing registration instructions

Site	Daytime			Nighttime		
	Regression estimates	Use shown on registration cards	Registration as percent of estimated use	Regression estimates	Use shown on registration cards	Registration as percent of estimated use
	-------Visitor days------			------Visitor days-------		
Devil's Canyon (transient site, signboard in center of road)	779	539	69.2	1,809	1,305	72.1
Panguitch Lake (destination site signboard on right-hand side of road)	3,720	3,579	96.2	6,841	4,481	65.5
Green River Lakes (destination site, signboard on left-hand side of road)	1,329	1,422	107.0	4,321	1,895	43.7

HOW TO USE THE SELF-REGISTRATION METHOD

The procedures described here will give reliable estimates of visitor use with a minimum of fieldwork if instructions are followed carefully and if field data are accurately collected.

The key tasks and timing are as follows:

Tasks	Timing
1. Selection of sites[10]	Prior to visitor-use season
2. Selection of sampling times	Prior to visitor-use season
3. Equipment and administration	Prior to and during visitor-use season

---

[10] The term "site" is used here to mean a campground, picnic area, or other place designated for one type of recreation. Within a site, the facilities normally used by one family or one group are called a "unit" or a "facility grouping."

4.	Visitor sampling	During visitor-use season
5.	Editing, coding, and keypunching of field data	During and immediately after visitor-use season
6.	Assembly and forwarding of punched data to processing center	When card punching is completed
7.	Computation of visitor estimates	When punched data are received

Instructions for each task follow:

Task 1--Selection of Sites

The suitability of sites for use of the self-registration method depends on four main factors. First, obviously, visitors must be asked to register or there is no basis for estimates. The method is especially well adapted to sites that already have a self-registration system used to enforce an entrance fee or permit. However, a self-registration system can be set up specifically for use estimation.

Second, the percentage of visitors registering should be fairly high for reliable estimates. The registration rate can be raised by good design and location of registration stations at the entrance sites. Registration can also be encouraged by the frequent presence of uniformed personnel.

Third, visitor-use estimates tend to be more accurate for large sites than for small sites.

Finally, the degree of uniformity within a group of sites should be fairly high if use for some sites is to be estimated from an area-wide relationship without sampling all sites. The sampled sites provide the basis for the estimate. Therefore, the unsampled sites must be matched with sampled sites that are similar in size, type of visitor use, and administration. Destination sites should be matched with other destination sites; one-night transient sites with other transient sites. Placement of the registration stations should be uniform. The amount of enforcement of registration and degree of "official presence" should also be similar for all sites to be grouped. Recreation attractions, provision for trailers, and climate are other factors to be considered in matching sites. These must be largely judgment decisions. Hard and fast rules cannot be written.

Task 2--Selection of Sampling Times

The sampling season should include the main-use period, Memorial Day to Labor Day for many sites.

Sampling schedules are developed in two stages. The first stage is to develop a sampling calendar for the amount of sampling one man could easily do without having to be in two places at the same time. The second stage is to divide the sampling times from one or more sampling calendars among several members of a crew so that each man can be scheduled for workdays of normal length and can be given 2 consecutive days off each week.

The procedures for developing a sampling calendar are approximately the same whether sampling is to be done on one site or several sites. The only differences are in the number of sampling hours selected and whether they are assigned to one or several sites. In either case, the steps are as follow:

1. Determine the number of weekdays and nonweekdays in the season. For example, in figure 3 the season from May 29 to September 5 contains 100 days--67 weekdays and 33 nonweekdays. (It was judged that May 29 and July 3 would be more like nonweekdays than normal weekdays because they fall between a weekend and a holiday.)

2. Lay out calendar sheets for the use season, and number the weekdays consecutively (in Fig. 3, 1 to 67). Then number the nonweekdays (in Fig. 3, 1 to 33)--either in a different color or encircled--to distinguish them from the weekday numbers. In figure 3, each day is numbered in the lower right-hand corner of the space for each date.

3. Because 12 daytime and 12 nighttime sample times will be assigned for each recreation site, divide 12 into two segments, to the nearest whole number, in proportion to the number of weekdays and nonweekdays in the season. Thus, using the data in figure 3, 67/100 X 12 = 8 weekday counts during the daytime and 8 weekday counts during the nighttime for each recreation site. This leaves 4 nonweekday counts for daytime and 4 nonweekday counts for nighttime on each site. Note, however, that the assignment of dates for nighttime counts must be independent from the assignment of dates for daytime counts.

4. If one person will participate in the sampling of more than one site, multiply the number of counts of each kind by the average number of sites one person will sample. Figure 3, for example, is for four sites. Therefore, it includes 4 X 8 = 32 daytime counts for weekdays, 4 X 4 = 16 daytime counts for nonweekdays, 4 X 8 = 32 nighttime counts for weekdays, and 4 X 4 = 16 nighttime counts for nonweekdays. If only one site were to be sampled, the count numbers would simply be 8, 4, 8, and 4.

Generally no more than four sites should be assigned to one person for nighttime sampling. There are many more possible sampling hours in daytime than nighttime and if necessary, more than four sites may be assigned to one person for daytime sampling.

5. Select actual sampling times from a table of random numbers. If available tables of random numbers have more than two digits per number, simply use the last two digits in each. Make a separate selection for each category of sampling times (i.e., daytime weekday, daytime nonweekday, nighttime weekday, and nighttime nonweekday). This is done in two steps. First, from the table of random numbers, select the first number within the range of numbered days on the calendar sheets. For example, in figure 3, numbers for weekdays can be selected between 01 and 67. Disregard larger numbers.

After each number for a day is selected, it is easiest to select daytime sampling hours by continuing along the random table until a number between 08 and 19 is reached. However, if both 2000 and 2100 are used as nighttime sampling hours, it is simpler to select the hour applicable to a date by tossing a coin rather than searching through the random table. For example, we might let "heads" equal 2000 and "tails" equal 2100. Sampling dates and hours are selected alternately until the required number have been selected.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Start → 28	MAY holiday 29 D-1300 ①	holiday 30 ②	31 1	JUNE 1 A-2000 2	2 C-2000 3	3 A-2000 ③
4 A-0900 ④	5 B-2000 4	6 B-1800 5	7 D-1500 D-2000 6	8 D-1400 A-2000 7	9 8	10 ⑤
11 ⑥	12 9	13 B-2000 10	14 A-1500 11	15 A-1700 12	D-0800 16 C-1300 C-2000 13	17 C-1400 D-1900 ⑦
18 ⑧	19 14	20 C-1700 D-2000 15	21 D-2000 16	22 D-1600 17	23 A-1200 18	24 B-1200 D-2000 ⑨
25 ⑩	26 19	27 B-2000 20	28 B-1000 C-2000 21	29 A-2000 22	30 B-2000 23	JULY 1 A-2000 ⑪
2 B-1400 D-2000 ⑫	holiday 3 ⑬	holiday 4 ⑭	5 C-2000 24	6 D-2000 25	7 26	8 B-1500 ⑮
9 D-1600 B-2000 ⑯	10 C-2000 27	11 C-2000 28	12 29	13 D-1500 30	14 31	15 A-0800 C-1300 ⑰
16 ⑱	A-1400 17 B-1600 D-2000 32	18 C-1900 33	19 A-1800 C-2000 34	20 35	21 D-2000 36	22 C-2000 ⑲
23 B-2000 ⑳	24 A-1600 C-2000 37	25 B-0900 38	26 A-1000 B-1500 39	27 40	28 A-2000 41	29 B-1200 C-2000 ㉑
30 A-1700 D-2000 ㉒	31 C-1000 D-0800 42	AUGUST 1 A-0900 B-2000 43	2 B-1500 C-1700 B-2000 44	3 45	4 B-0900 A-2000 46	5 B-2000 ㉓
6 C-1400 C-2000 ㉔	7 C-0800 47	8 D-2000 48	9 49	10 50	11 D-1900 51	12 ㉕
13 ㉖	14 52	15 53	16 B-1000 54	17 55	18 C-1300 D-2000 56	19 A-1300 ㉗
20 ㉘	21 57	22 A-2000 58	23 59	24 B-2000 - 60	25 61	26 C-2000 ㉙
27 D-2000 ㉚	28 A-2000 62	29 B-2000 63	30 64	31 65	SEPTEMBER 1 D-1700 66	2 A-2000 ㉛
3 A-2000 ㉜	holiday 4 C-1100 D-1800 ㉝	5 C-1500 A-2000 67	Finish ← 6	7	8	9

Figure 3.--Calendar worksheet.

Be sure that no site has more than one daytime or more than one nighttime sample on the same date. A site may have a daytime and a nighttime count on the same date, provided they were selected independently. Also, different sites may be sampled on the same date, provided that sampling hours are scheduled to give adequate time for each count and adequate travel time between sites. As an example, figure 3 was constructed with the assumption that no count should be scheduled at less than 2 hours from a count on another site.[11] However, if sites are small enough and close enough together to permit adequate sampling of two sites in 2 consecutive hours, this limitation would not apply.

After sampling calendars have been developed to include all sites to be sampled, combine them into a work schedule for the sampling crew. For example, figure 4 shows the work schedule for May 29 to June 30 for a crew of three people responsible for sampling eight recreation sites. Note that sample-count workweeks are irregular. However, workweeks scheduled around random sample counts may have advantages in allowing time for visitor contact, enforcement of entrance permits and fee collection, and prevention of vandalism.

It may be necessary to hire extra people--probably on a part-time basis--to help with nighttime counts. There are as many nighttime counts as daytime counts, but less time to make the counts, so the nighttime work may pile up.

Task 3--Equipment and Administration of Self-Registration System

The necessary equipment is (1) a registration station at the entrance to the site with instructions on a sign and a supply of cards and envelopes (fig. 5) and (2) a card deposit box at each unit within the site. Suggestions for installing registration stations are given below.

A registration station on an island in the center of the road is best. Island locations have resulted in higher registration percentages than locations on the right or left side of the road because drivers can conveniently read the instructions and take a registration card without leaving their cars. The right-hand location is second best.

The registration stations must be kept supplied with cards and envelopes at all times. Completed cards and envelope flaps should be collected from deposit boxes at least once a week. When the cards and flaps are collected, fill in any blank spaces if possible. If the party is still present, missing information should be obtained from them. If they are gone, neighboring visitors may be able to help.

The cards and flaps collected from each site are placed in a sturdy envelope marked with the name of the site. This is very important! If cards from two sites get mixed up, the use estimates for both sites are worthless.

---

[11] Because two sites could not be assigned during the 2 consecutive hours available for nighttime sampling, all nighttime samples were scheduled for 2000 and none for 2100. These samples are used only to determine how many overnight visitors there are, and if most overnight visitors have arrived by 2000, there is no point in extending sampling any later unless it permits one person to sample an additional site.

WORK SCHEDULE

May 29 through June 30

RALPH	DAVE	MRS. GILLESPIE
(Work hours: 0700-1600 except 1200-2100 on June 3 and June 30)	(Work hours: 1200-2100)	(Local resident hired on an hourly basis)
Days off: May 30-31, June 1, 7-8, 13-14, 21-22, 26-27	Days off: June 2-4, 9-10, 17-18, 23-24, 30	

		May	
29	D-1300, H-1500		
30		H-1500	F-2000
		June	
1		A-2000	H-2000
2			C-2000
3	F-1700, A-2000		
4	A-0900		F-2000
5		B-2000	E-2000
6	H-1600	B-1800, H-2000	
7		D-1500, F-1800, D-2000	
8		H-1200, D-1400, A-2000	E-2000
9	E-1200		
10	E-0900		
11	E-0900	F-2000	
13		B-2000	
14		A-1500, H-1900, H-2000	
15	E-0800	A-1700	G-2000
16	D-0800, C-1300	G-1400, F-2000	C-2000
17	C-1400		D-1900
20		C-1700, D-2000	
21		D-2000	
22		D-1600	
23	A-1200		
24	F-0900, B-1200		D-2000
25	G-1000		H-2000
27		B-2000	
28	B-1000	E-1100, G-2000	C-2000
29		E-1500, A-2000	H-2000
30	G-1800		B-2000

Figure 4.--Schedule for a crew sampling recreation sites A,B,C,D,E,F,G, and H.

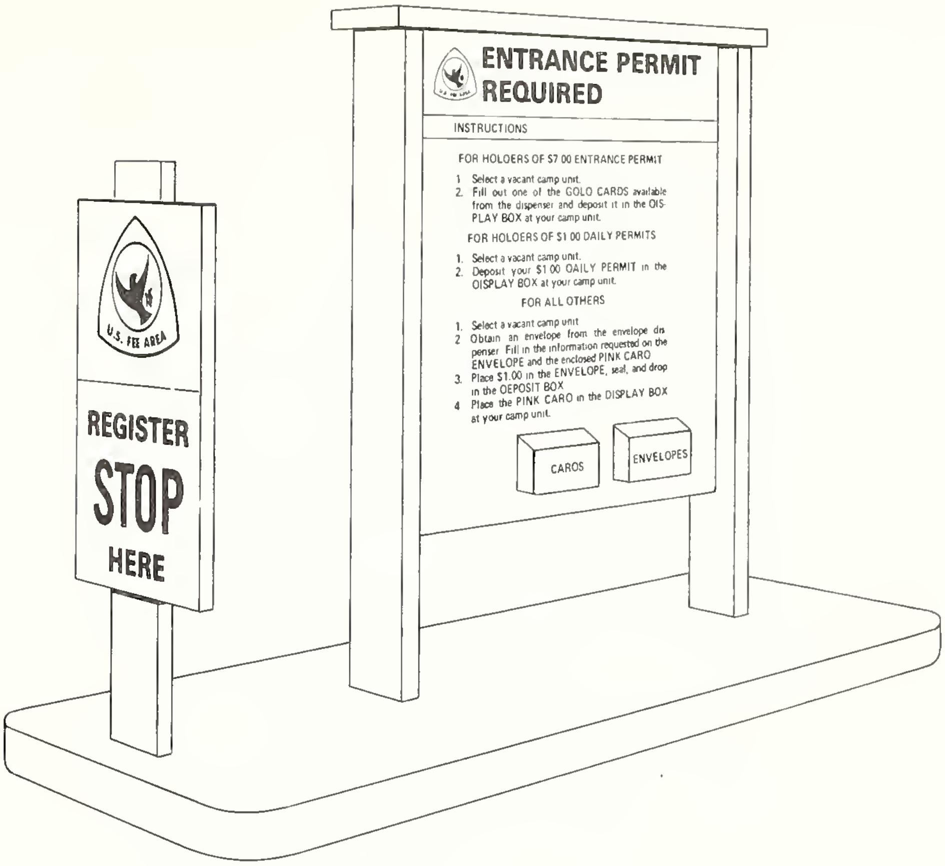

ENTRANCE PERMIT REQUIRED
INSTRUCTIONS
FOR HOLDERS OF $7.00 ENTRANCE PERMIT
1. Select a vacant camp unit.
2. Fill out one of the GOLD CARDS available from the dispenser and deposit it in the DISPLAY BOX at your camp unit.
FOR HOLDERS OF $1.00 DAILY PERMITS
1. Select a vacant camp unit.
2. Deposit your $1.00 DAILY PERMIT in the DISPLAY BOX at your camp unit.
FOR ALL OTHERS
1. Select a vacant camp unit.
2. Obtain an envelope from the envelope dispenser. Fill in the information requested on the ENVELOPE and the enclosed PINK CARD.
3. Place $1.00 in the ENVELOPE, seal, and drop in the DEPOSIT BOX.
4. Place the PINK CARD in the DISPLAY BOX at your camp unit.
CARDS
ENVELOPES
U.S. FEE AREA
REGISTER
STOP
HERE

Figure 5.--Registration station.

Collected cards and flaps may be sent to the central office once a week for keypunching. At the end of the season, send the central office a form 1 (fig. 6), with blocks 1 to 12 and any site closure information filled out, for every site for which use estimates from self-registration are to be made. This includes sites sampled in previous years (situation 2) and sites never sampled (situation 3). Form 1 provides key information for the computer.

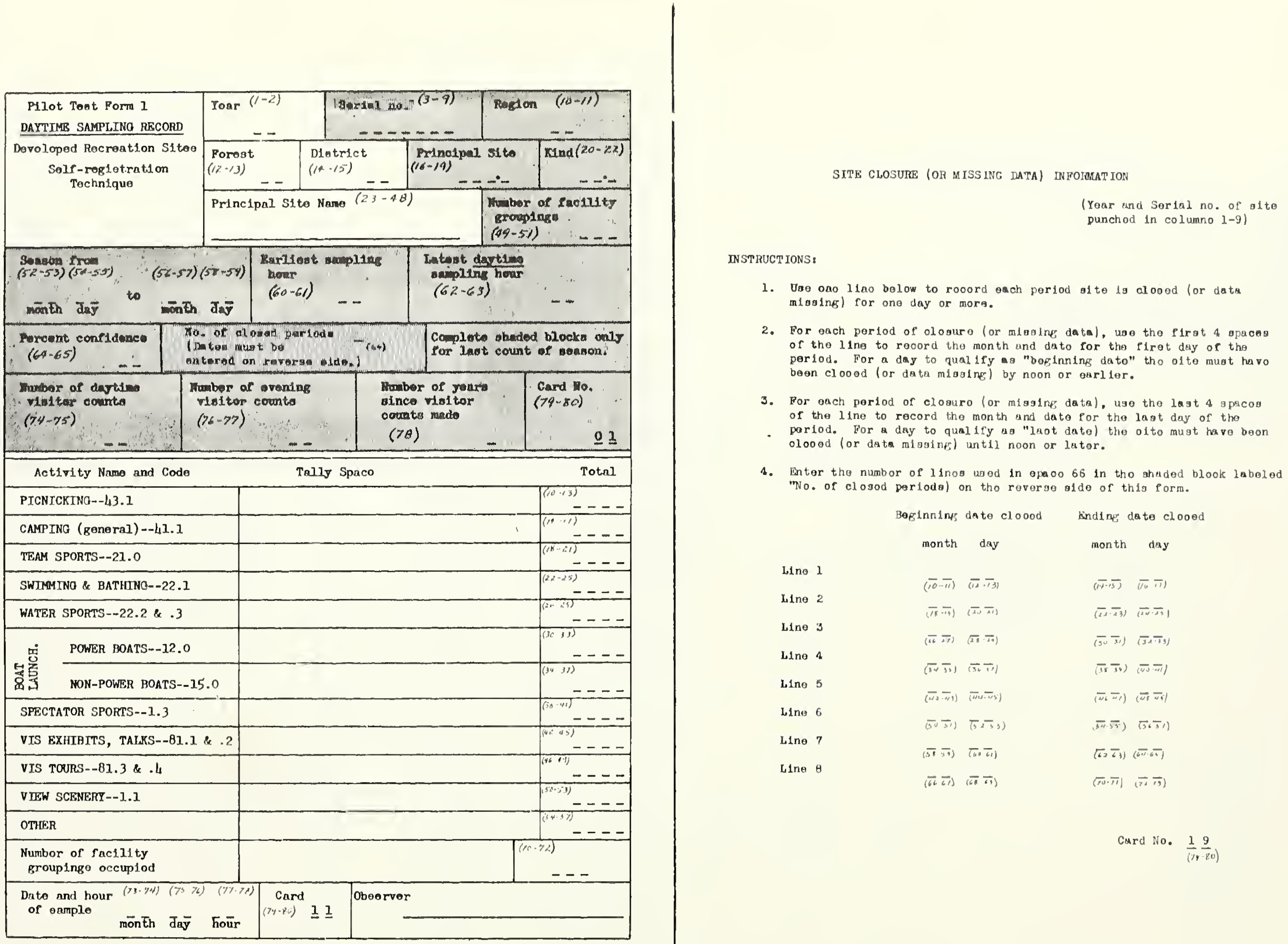
Site closure data.--If a site is closed for one or more periods during the season, the number of periods must be shown in the shaded block labeled "No. of closed periods" on form 1. The dates of all closures must be shown on the back of form 1, where spaces are provided for up to eight closures. Note that the site must be closed at least half a day before that day can be included in a "closed" period.

If self-registration data are missing for one or more periods, these can be entered as site closures. Season-long estimates of visitor use may then require adjustment for the missing data.

Task 4--Visitor Sampling

Sample counts of visitors are made at least every fifth year to establish relationships between registration and visitor use at each sampled site. During the sampling year, a total of 24 randomly scheduled on-the-hour counts is required for each site--12 during daytime hours (normally 0800-1900) and 12 during nighttime hours (normally 2000-2100).

The schedule must be followed exactly. Once a count has been scheduled, do not change its time for any reason. It is better to miss a count completely than to reschedule a missed count.



Pilot Test Form 1 DAYTIME SAMPLING RECORD Developed Recreation Sites Self-registration Technique	Year (1-2) __ __	Serial no. (3-9) __ __ __ __ __ __ __	Region (10-11) __ __	
	Forest (12-13) __ __	District (14-15) __ __	Principal Site (16-19) __ __ __.__	Kind (20-22) __ __.__
	Principal Site Name (23-48) ______		Number of facility groupings (49-51) __ __ __	
Season from (52-53) (54-55) month day to (56-57) (58-59) month day	Earliest sampling hour (60-61) __ __	Latest daytime sampling hour (62-63) __ __		
Percent confidence (64-65) __ __	No. of closed periods (Dates must be entered on reverse side.) (66) __	Complete shaded blocks only for last count of season.		
Number of daytime visitor counts (74-75) __ __	Number of evening visitor counts (76-77) __ __	Number of years since visitor counts made (78) __	Card No. (79-80) 0 1	

Activity Name and Code	Tally Space	Total
PICNICKING--43.1		(10-13) __ __ __ __
CAMPING (general)--41.1		(14-17) __ __ __ __
TEAM SPORTS--21.0		(18-21) __ __ __ __
SWIMMING & BATHING--22.1		(22-25) __ __ __ __
WATER SPORTS--22.2 & .3		(26-29) __ __ __ __
BOAT LAUNCH. POWER BOATS--12.0		(30-33) __ __ __ __
BOAT LAUNCH. NON-POWER BOATS--15.0		(34-37) __ __ __ __
SPECTATOR SPORTS--1.3		(38-41) __ __ __ __
VIS EXHIBITS, TALKS--81.1 & .2		(42-45) __ __ __ __
VIS TOURS--81.3 & .4		(46-49) __ __ __ __
VIEW SCENERY--1.1		(50-53) __ __ __ __
OTHER		(54-57) __ __ __ __
Number of facility groupings occupied		(70-72) __ __ __
Date and hour of sample (73-74) (75-76) (77-78) month day hour	Card (79-80) 1 1	Observer ______

SITE CLOSURE (OR MISSING DATA) INFORMATION

(Year and Serial no. of site punched in columns 1-9)

INSTRUCTIONS:

1. Use one line below to record each period site is closed (or data missing) for one day or more.
2. For each period of closure (or missing data), use the first 4 spaces of the line to record the month and date for the first day of the period. For a day to qualify as "beginning date" the site must have been closed (or data missing) by noon or earlier.
3. For each period of closure (or missing data), use the last 4 spaces of the line to record the month and date for the last day of the period. For a day to qualify as "last date" the site must have been closed (or data missing) until noon or later.
4. Enter the number of lines used in space 66 in the shaded block labeled "No. of closed periods) on the reverse side of this form.

	Beginning date closed		Ending date closed	
	month	day	month	day
Line 1	(10-11)	(12-13)	(14-15)	(16-17)
Line 2	(18-19)	(20-21)	(22-23)	(24-25)
Line 3	(26-27)	(28-29)	(30-31)	(32-33)
Line 4	(34-35)	(36-37)	(38-39)	(40-41)
Line 5	(42-43)	(44-45)	(46-47)	(48-49)
Line 6	(50-51)	(52-53)	(54-55)	(56-57)
Line 7	(58-59)	(60-61)	(62-63)	(64-65)
Line 8	(66-67)	(68-69)	(70-71)	(72-73)

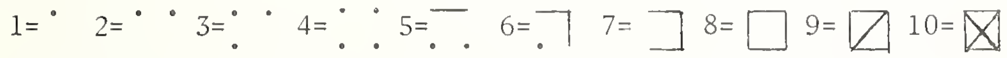
Card No. 1 9 (79-80)

Figure 6.--Daytime sampling record (Pilot test form 1); at right, reverse side is shown.

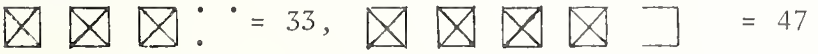
Make each of the 24 on-the-hour sample counts of visitor use during a systematic tour through the recreation site. This tour may be by vehicle or on foot. It should be planned so that all parts of the site are covered but none is double counted.

Start each sample count so that half the time spent in counting falls on each side of the hour scheduled for counting. For example, if it is estimated that 20 minutes would be needed to count all people present for a sample scheduled at 1600, start the count at 1550 and complete it at 1610. One person can normally complete an on-the-hour count in less than an hour. However, if a large area is heavily used, the count may be started as early as 45 minutes before the hour and continued as late as 45 minutes after the hour, providing up to an hour and a half for the count. If this still is not enough time, divide the counting between two or more people so that no counting needs to be more than 45 minutes from the scheduled hour. In such cases, divide the site along clearly recognizable lines so that no part is either covered twice or left uncovered.

Daytime counts.--During each daytime count, record visitor use by activities listed on form 1, Daytime Sampling Record (figure 6). Use a separate form for each count. Before starting a count, complete the unshaded blocks at the top of the form and the "Date and hour of sample" at the bottom of the form. Record the number of people participating in each activity in the "tally space," using the following tally system:



Note that dots and lines are added until each unit of 10 is completed. Thus:



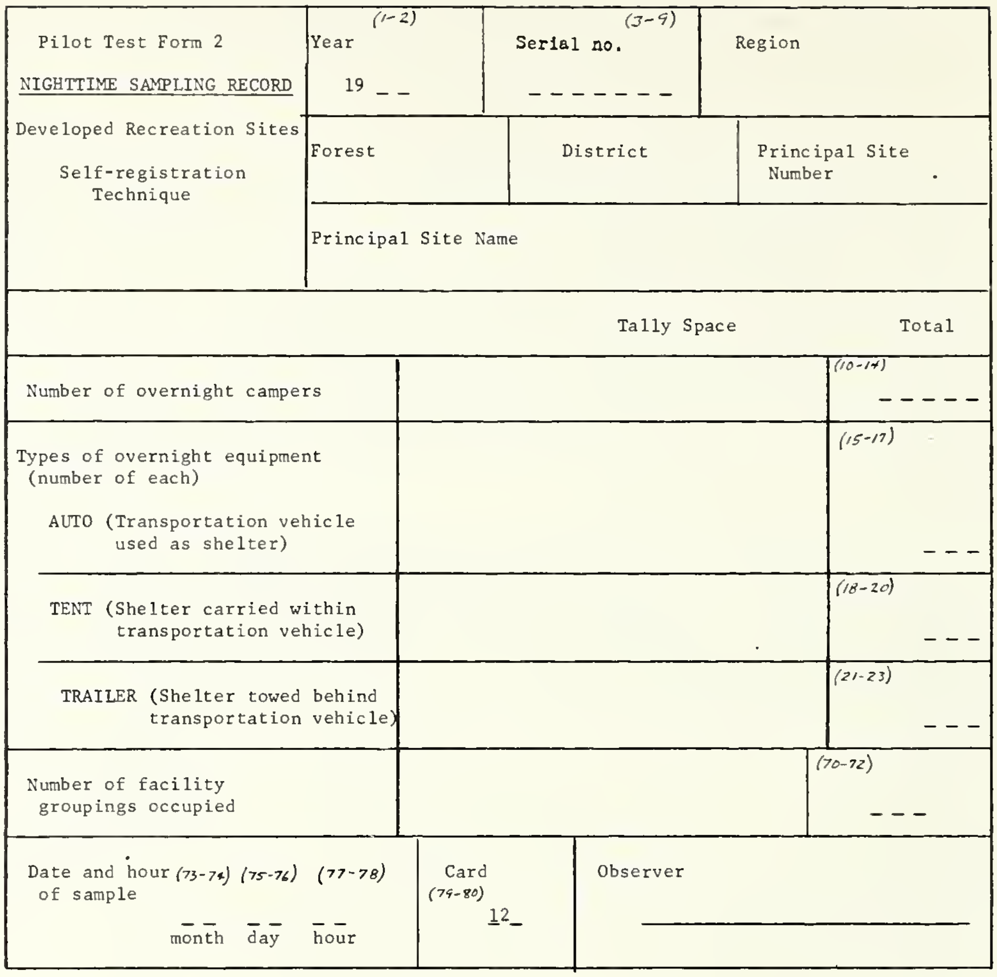
Record visitors on the basis of the activity they are participating in when seen. If no specific category on form 1 seems to fit, record in the space labeled "Other." Don't make estimates for daytime visitors who seem to be temporarily away from their camp units. If present anywhere on the site, people away from camp units will be recorded under the activities listed on form 1.

The number of facility groupings occupied must be determined at each count. A facility grouping is recorded as occupied if people are present or if equipment is present.

Immediately after a visitor sample is completed, add the counts within each tally space and write the total for that activity in the column labeled "Total."

It is essential to write numbers on the form above blanks so that any unused blanks are to the left of the number. For example, 21 would be written _ _ 2 1. When the form has been completed, check it thoroughly, sign it, and store it in a safe place.

During the last count of the season, fill in the shaded blocks to show Serial no., Region, Principal Site, Kind, Number of facility groupings, Season (beginning and ending dates), Earliest sampling hour (normally 0800), Latest daytime sampling hour (normally 1900), Number of daytime visitor counts (normally 12), Number of nighttime visitor counts (normally 12), and Site closure data. Leave the remaining blanks to be filled in at the central office.



Pilot Test Form 2 NIGHTTIME SAMPLING RECORD	(1-2) Year 19 _ _	(3-9) **Serial no.** _ _ _ _ _ _ _	Region
Developed Recreation Sites Self-registration Technique	Forest	District	Principal Site Number .
	Principal Site Name		

	Tally Space	Total
Number of overnight campers		(10-14) _ _ _ _ _
Types of overnight equipment (number of each) AUTO (Transportation vehicle used as shelter)		(15-17) _ _ _
TENT (Shelter carried within transportation vehicle)		(18-20) _ _ _
TRAILER (Shelter towed behind transportation vehicle)		(21-23) _ _ _
Number of facility groupings occupied		(70-72) _ _ _

Date and hour of sample (73-74) (75-76) (77-78) _ _ month _ _ day _ _ hour	Card (79-80) 12_	Observer ________________

Figure 7.--Nighttime sampling record (Pilot test form 2).

Nighttime counts.--Nighttime counts are made as a basis for estimating overnight use. Each count is tallied on form 2, Nighttime Sampling Record (figure 7). Procedures are similar but not identical to those used for the daytime counts. Before a count is started, fill in the blocks at the top of the form and the "Date and hour of sample" at the bottom of the form. Then count and record the number of overnight campers (individuals, not groups), the number of units of overnight equipment in categories of AUTO, TENT, and TRAILER, and the number of facility groupings occupied.

In most cases, campers will be at their camp units by the time nighttime counts are made (2000 or 2100). If campers gather together at one unit to visit during the evening, or if they are attending an organized campfire program within the same developed site, simply count them wherever they are seen. However, if there is evidence (such as equipment present but vehicle gone) that a camp unit will be occupied by people who are absent from the site when the count is taken, then estimate the number of campers who will be present for the night. This can be done (1) by reading the current registration card (if any) in the deposit box at the unit; (2) by asking people at a nearby unit; or (3) by estimation from the types and amounts of equipment present.

When form 2 has been completed, check it thoroughly, sign it, and place it in a safe place along with the Daytime Sampling Records.

Immediately after the end of the visitor season, send all forms to the central office.

Task 5--Editing, coding, and keypunching of field data

At the central office, site identification data, the self-registration data, and all sample-count data are edited, coded, and keypunched onto cards for computer processing. Self-registration cards and flaps can be edited, coded, and keypunched whenever they are received during the visitor season. However, it is easier to edit and punch the remaining data in one operation at the end of the season.

A self-registration card or flap can be used for estimation only if it shows (1) number of visitors, (2) arrival time and date, and (3) expected departure time and date. Because the proportion of incomplete cards and flaps is normally fairly consistent, the precision of estimates will not be affected much by omitting such cards and flaps.

Editing and coding of entries for keypunching should be done in red or some other color to distinguish them from the original entries. (A felt-tipped pen works well for this.)

Since visitors who use envelopes to pay on a daily basis may fill out several envelope flaps during a stay of several days, names and dates must be compared during editing of these flaps. All data for one stay must be combined on a single flap.

Data on each card and single flap representing a full visit are coded as follows:

Number of people in vehicle--2 digits (e.g., 05)

Month and day arrived--2 digits for month, 2 digits for day of month (e.g., June 6 is coded 0606; July 23 as 0723).[12]

Hour arrived--2 digits. This is the first on-the-hour time the visitor group is present. Thus an arrival time of 2:30 p.m. is coded as 15, 9:00 a.m. as 09, 10:50 p.m. as 23, etc.

Month and day will leave--2 digits for month, 2 digits for day of month.

Hour will leave--2 digits. This is the last on-the-hour time a visitor group is present. Thus a departure time of 2:30 p.m. is coded 14; 9:00 a.m., 09; 10:50 p.m., 22.

At least one copy of form 1 will be received for each site. For sites sampled during the current season, there will be a form 1 for each daytime visitor count. The last form 1 of the season will have most of the shaded blocks filled in. Any incomplete blocks can be filled in at the central office. This copy should be kept on file at the central office for use in completing the shaded blocks of form 1 in succeeding years.

For sites sampled during a previous year, there will be only one form 1. The first 12 blocks and any site closure information should have been completed. The remaining shaded blocks on this form can be completed in the central office by reference to the form 1 kept on file from the sampling year. The difference between the current year and the sample-count year should be entered as "Number of years since visitor counts made." Thus, on a form 1 for the 1971 visitor season, with sampling done in 1968, the number of years would be 3.

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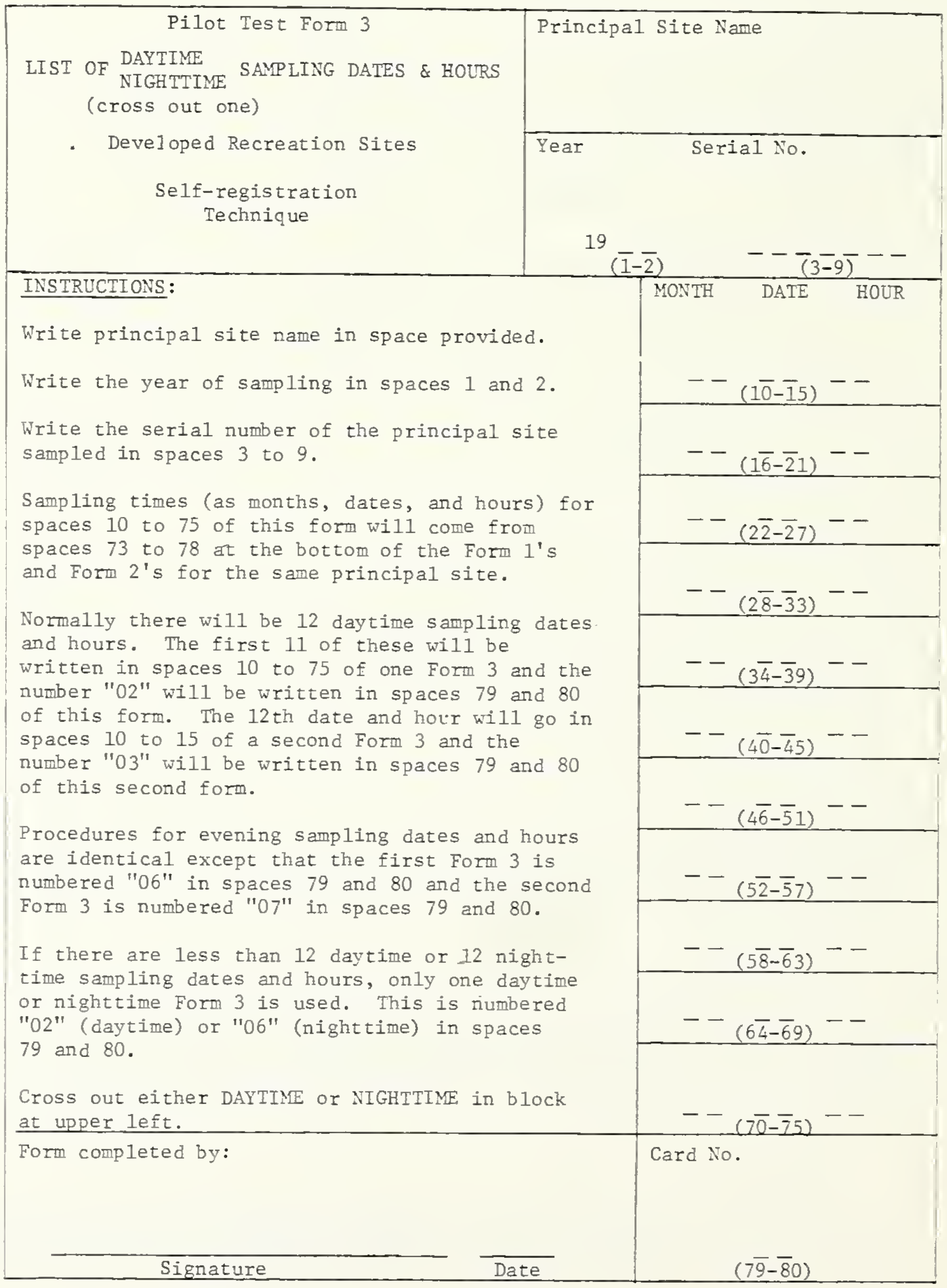
[12] Normally the visitor-use samples will be in the summer months. However, if data extend into 2 calendar years, months during the second year must be coded as 12 plus month number. Thus January of the second year would be coded as 13, February as 14, etc.

For sites that have not been sampled but for which self-registration estimates are to be made, there will be a form 1 with the first 12 blocks and any site closure information completed. This should be checked for completeness, but nothing need be added.

A form 2 will be submitted for each nighttime sample count at sites sampled in the current year. This needs only checking for clarity and completeness.

Form 3 is a list of sampling dates and hours (figure 8). Normally four of these are completed at the central office from the forms 1 and 2 for each currently sampled site. Instructions on form 3 should be followed carefully, and the blanks should always be filled consecutively from the top down, without skipping.



Pilot Test Form 3

LIST OF DAYTIME NIGHTTIME SAMPLING DATES & HOURS
(cross out one)

. Developed Recreation Sites

Self-registration
Technique

Principal Site Name

Year 19 __ __ (1-2)

Serial No. __ __ __ __ __ __ __ (3-9)

INSTRUCTIONS:

Write principal site name in space provided.

Write the year of sampling in spaces 1 and 2.

Write the serial number of the principal site sampled in spaces 3 to 9.

Sampling times (as months, dates, and hours) for spaces 10 to 75 of this form will come from spaces 73 to 78 at the bottom of the Form 1's and Form 2's for the same principal site.

Normally there will be 12 daytime sampling dates and hours. The first 11 of these will be written in spaces 10 to 75 of one Form 3 and the number "02" will be written in spaces 79 and 80 of this form. The 12th date and hour will go in spaces 10 to 15 of a second Form 3 and the number "03" will be written in spaces 79 and 80 of this second form.

Procedures for evening sampling dates and hours are identical except that the first Form 3 is numbered "06" in spaces 79 and 80 and the second Form 3 is numbered "07" in spaces 79 and 80.

If there are less than 12 daytime or 12 nighttime sampling dates and hours, only one daytime or nighttime Form 3 is used. This is numbered "02" (daytime) or "06" (nighttime) in spaces 79 and 80.

Cross out either DAYTIME or NIGHTTIME in block at upper left.

MONTH	DATE	HOUR
__ __	__ __ (10-15)	__ __
__ __	__ __ (16-21)	__ __
__ __	__ __ (22-27)	__ __
__ __	__ __ (28-33)	__ __
__ __	__ __ (34-39)	__ __
__ __	__ __ (40-45)	__ __
__ __	__ __ (46-51)	__ __
__ __	__ __ (52-57)	__ __
__ __	__ __ (58-63)	__ __
__ __	__ __ (64-69)	__ __
__ __	__ __ (70-75)	__ __

Form completed by:

Signature Date

Card No.

__ __ (79-80)

Figure 8.--List of daytime or nighttime sampling dates and hours (Pilot test form 3).

The cards to be keypunched from the self-registration data and forms 1, 2, and 3 are as follows (identification codes are shown in parentheses):

Site name card (01)

Site closure card, if needed (19)

List of daytime sampling dates and hours (02, 03)

List of nighttime sampling dates and hours (06, 07)

Self-registration data (10)

Daytime sample-count data (11)

Nighttime sample-count data (12).

On all cards for each site, columns 79 and 80 are used for the card identification codes indicated above.

On all cards for each site, columns 1 and 2 are used for the year and columns 3 to 9 for the serial number assigned by the data processing center for that particular site. These numbers permit cards for a specific year and site to be identified at any time.

Computer cards are punched directly from the coded self-registration cards and flaps and from forms 1, 2, and 3. No decimals are punched for any of the data.

Keypunching details for each type of card follow:

Site name cards.--Only one site name card is punched for each site for each season. The information is punched directly from the blocks at the top of form 1. (This form indicates column numbers for all punches.) For sites currently sampled, the form 1 for the last daytime visitor count of the season should be used, and columns 1 to 66 and 74 to 80 are punched. Punching is the same for sampled sites in succeeding years when they are not sampled (situation 2). For unsampled sites, however, site name cards are punched only in columns 1 to 66 and 79 to 80.

Site closure card.--A site closure card is used only when one or more closures (or periods of missing self-registration data) are indicated by a punch in column 66 of the site name card (and in the shaded block labeled "No. of closed periods" on form 1). Data and instructions for punching the site closure card are given on the back side of the form 1 from which the site name card is punched.

Cards for sampling dates and hours.--These are punched directly from form 3 for all currently sampled sites. Again, column numbers are indicated on the form.

Cards for self-registration data.--Computer cards are punched directly from the edited and coded self-registration data from all sites. Information from three self-registration cards or flaps is punched onto one computer card, as follows:

Field number	Card field	Columns	
		From	To
1	Year	1	2
2	Serial number	3	9
	FOR FIRST REGISTRATION CARD		
3	Number of people in vehicle	11	12
4	Arrived month	13	14
5	Arrived date	15	16
6	Arrived hour	17	18
7	Expected departure month	19	20
8	Expected departure date	21	22
9	Expected departure hour	23	24
10	Zip code	25	29
	FOR SECOND REGISTRATION CARD		
3	Number people in vehicle	31	32
4	Arrived month	33	34
5	Arrived date	35	36
6	Arrived hour	37	38
7	Expected departure month	39	40
8	Expected departure date	41	42
9	Expected departure hour	43	44
10	Zip code	45	49
	FOR THIRD REGISTRATION CARD		
3	Number people in vehicle	51	52
4	Arrived month	53	54
5	Arrived date	55	56
6	Arrived hour	57	58
7	Expected departure month	59	60
8	Expected departure date	61	62
9	Expected departure hour	63	64
10	Zip code	65	69
11	Blank	70	78
12	Card number	79	80

Cards for sample-count data.--These are punched only for currently sampled sites. For daytime sample-count information, one card is punched for the visitor-count portion of each form 1 completed during the sampling season. For each nighttime count, one card is punched for each form 2 completed during the season. Column numbers for all punches are specified (in parentheses) in the blocks of forms 1 and 2.

Area-wide ID cards.--In addition to the cards punched for individual sites, an area-wide ID card must be punched to identify each area and within it the kind of recreation sites for which area-wide relationships are to be used. The purposes of this card are (1) to provide a label for distinguishing one group of relationships from another; and (2) to list the site data to be used for each set of area-wide relationships.

Columns 1 and 2 of each area-wide ID card are punched with the current year. Columns 3 to 9 are punched with a code number that identifies the area and kind of sites included. This code number can have any combination of letters and numbers but should be consistent with procedures established by the data processing center. Columns 10 through 80 of each area-wide ID card can be used for any further identification desired. For example, these columns might be used for the message "R-4, FORESTS 8 & 9, SMALL TRANSIENT CAMPGROUNDS."

On the back of each area-wide ID card, a member of the central office recreation staff should write two headings and lists of numbers. The first heading is: Use "15" and "16" cards from. This heading is followed by the year and serial number for each site that is to contribute data to one set of area-wide relationships. The second heading is: Use "10" cards from. This heading is followed by the year and serial number for each site for which use is to be estimated by the same set of area-wide relationships. For example, the back of the area-wide ID card for small transient campgrounds might read as follows:

Use "15" and "16" cards from 680018732, 680018767, 680019014, and 670018747.

Use "10" cards from 680018745, 680018752, 680019325, 680019326, and 680019329.

This permits the processing center personnel to assemble the necessary information for developing area-wide relationships and making estimates of visitor use for unsampled sites.

Task 6--Assembly and Forwarding of Punched Data to the Processing Center

As soon as the central office personnel have completed all of the card punching, they should place the cards for each site in the order shown above. Cards should then be bound (with a rubber band) by individual sites and marked with site name and forest. The area-wide ID cards should also be bound together with a rubber band. All of the cards should then be sent to the data processing center or park administrative unit.

Task 7--Computation of Visitor Estimates

When the processing center personnel receive the punched cards from the transmitting office, they will prepare the estimates using the computer programs designed for self-registration data.[13] This will produce printout sheets similar to those on page 2.

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[13] Copies of these computer programs are available upon request from the Intermountain Forest and Range Experiment Station, Ogden, Utah.

FOREST SERVICE CREED

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